

Warehouse Sprinkler Protection **NFPA 13 – 2016 Edition**



The latest version of NFPA 13: *Standard for the Installation of Sprinkler Systems, Installation of Sprinkler Systems* sets a new benchmark for automatic fire sprinkler systems to safeguard people and property against fire. Revised to reflect the challenges of fire protection in today's built environment, NFPA 13-16 presents the latest requirements for automatic sprinkler system design, installation and acceptance testing. The National Fire Protection Association, UL and FM Global conducted extensive full scale testing to guide development of NFPA 13-16.

Updates to NFPA 13-16 allow for more design options and greater usability. Changes that are most relevant for manufacturers and distributors of EPS products include:

- New and updated commodity classification tables, the first update in two decades
- For the first time in NFPA 13's history protection schemes for Group A exposed expanded plastics stored in racks were added

Each of these new sections is a beginning approach to improving protection, but not an end. This is one of the reasons NFPA standards are revised every three years, so that new research can be incorporated into the standard. NFPA 13-16 represents the most up-to-date application of research, science and analysis.

NFPA 13-16 is an installation standard, not an occupancy code. The local building code will determine whether sprinklers are required and will also determine whether the latest version of NFPA 13-16 is in force. NFPA 13-16 may not yet be the governing standard, but it does represent current best practices when designing and installing sprinkler systems. Refer to the local code applicable in your area to determine which version of NFPA 13-16 is currently referenced for compliance.

Two key factors to consider when designing the proper fire protection for warehouse storage: the commodity classification and storage configuration.

Commodity Classifications

There are several changes to Chapter 5 *Classification of Occupancies and Commodities* to help users properly define what type of storage commodity they are dealing with. They reflect modern day storage facilities and materials that have evolved from wood and metal to plastics. Updated classification tables based on today's materials help sprinkler system designers avoid common errors in classifying commodities. This improves accuracy and reduces the risk for mistakes that could prove catastrophic in a fire.

The first level of Group A plastics are now separated into cartoned, exposed and free-flowing. These changes were made to help simplify the identification of commodity classes, and to place free-flowing as a standalone consideration. Now when a designer is attempting to classify plastics, the question simply becomes is the commodity cartoned, exposed or free-flowing. At that point the only item requiring additional consideration are exposed plastics.

THE REVISION OF THE COMMODITY CLASSIFICATION TABLES SET OUT IN CHAPTER 5 IS SUMMARIZED BELOW. EPS IS A CLASS IV, GROUP A PLASTIC.

CLASS I NON-COMBUSTIBLE	CLASS II NON-COMBUSTIBLE	CLASS III	CLASS IV
On a wood Pallet	Slatted wood crate	Wood	Group B Plastics
Single layer corrugated carton	Solid wood box	Paper	Free-flowing Group A Plastic
Shrink or paper wrapped	Multi-layer corrugated carton	Group C Plastic	Cartoned or wooden crate >5% up to 15% unexpanded Group A Plastic

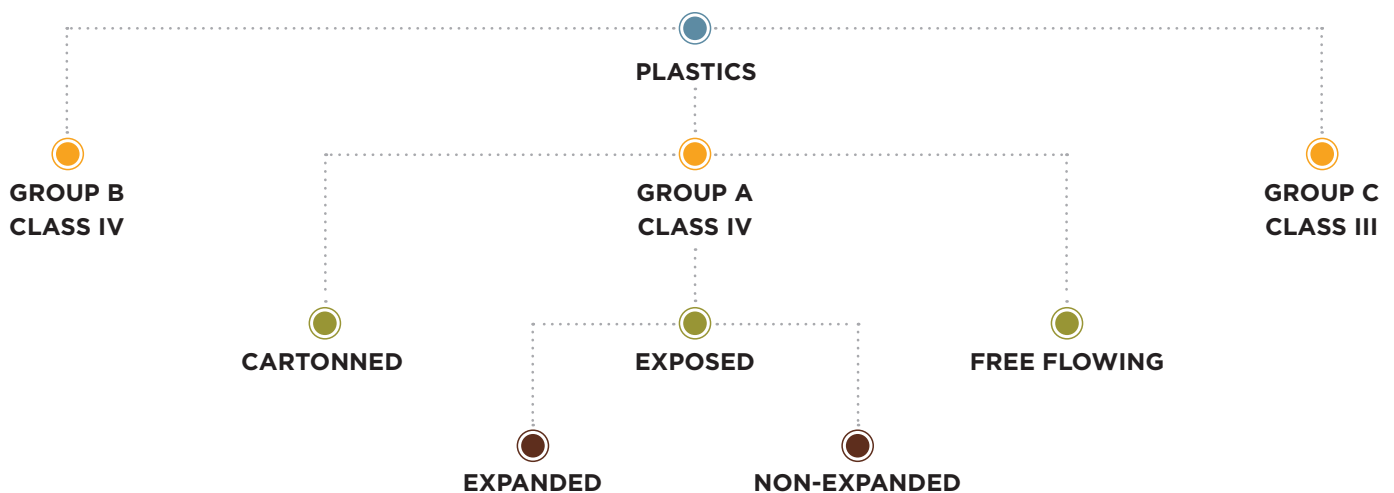


Cartoned, Expanded Plastic



Exposed, Expanded Plastic

Cartoned or wooden crate that contains a mix of unexpanded and expanded Group A Plastic
Exposed that contains a mix of unexpanded and expanded Group A Plastic



Storage Configuration

Two new sections have been added to Chapter 17 *Rack Storage of Plastic Commodities*:

- **Section 17.2.3.5 to cover storage 25 feet (7.6m) in height or less**
- **Section 17.3.3.5 to cover storage over 25 feet (7.6m) in height**

Storage configuration considers racking versus stacking methods, the height of the building relative to the height of the storage configuration and the space between the storage and the sprinklers, among others. The studies and testing commissioned to develop the changes to Chapter 17 examined the effects of storage solutions and approaches. It was determined that how storage solutions are configured affects how a fire spreads and more importantly, how to control a fire and keep it from spreading.

EXPOSED EXPANDED GROUP A PLASTICS IN RACKS New Section 17.2.3.5

- Single, double, multiple-row racks
- 25 ft. max storage height
- 40 ft. max ceiling height
- Intermediate temperature-rated ESFR pendent sprinklers, K-25.2
- 12 hydraulically demanding sprinkler design area
- 60 psi min. operating pressure
- 8 ft min. isle width
- Solid vertical barrier, 3/8 in. plywood or 22 gauge sheet metal, from face of rack to face of rack, 16.5 ft intervals
- Extend 4 in. above floor to max storage height
- Area of storage between vertical barriers & isles shall not exceed 124 ft²
- Vertical fire barrier shall extend across the longitudinal flue
- Commodity shall be permitted to extend a nominal 4 in. beyond the vertical barrier at the isle





Sprinkler Systems

A basic familiarity with the types of sprinklers and sprinkler systems will be helpful to understand the fire protection expert's input. Different sprinkler types include:

- **ESFR** Early Suppression Fast Response
- **CMSA** Control Mode Specific Application
- **CMDA** Control Mode Density/Area

Sprinklers are further designated by k-factor, which is used to calculate the output of a sprinkler head by the following formula:

Q = k-factor • √ pressure

- **Q** = output in gallons per minute
- **Pressure** = water pressure at in psi
- **k-factor** = performance value of sprinkler

In addition to k-factor of the sprinkler, water system pressure is also critical. Pressure not only impacts output, but also influences water droplet size. Minimum pressures of 7-10 psi may be sufficient in some situations, but high flow systems may require pressure of 50 psi or more. High pressure and volume may require on-site pumping capabilities which add expense and complexity. While all sprinkler systems should be evaluated for their effectiveness, manufacturers who store exposed Group A plastics should exercise due diligence to ensure they have adequate protection.

Fire protection is a complex balance of design and execution. Effective fire protection requires a mix of sprinkler types, specific placement and careful warehouse configuration. Proper fire suppression system design in accordance with NFPA 13-16 is essential to prevent catastrophic losses to facilities.

SOURCES

NFPA 13: Standard for the Installation of Sprinkler Systems, 2016 Edition
Suppression Mode Sprinkler System Installation Issues, FM Global

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